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7th Global Neurologists Annual Meeting on

Neuro Surgery and Interventional Radiology

August 22-24, 2016   Vienna, Austria

Neuronal Activity Topography (NAT) Print -Visualization application from harmonic analysis to geometric pattern

Takashi Shibata
Stroke Center, Saiseikai Toyama Hospital, Japan

The method of neuronal activity topography (NAT) is a complex and harmonic theory by fourier transform. However, it seems to be very far away from understanding and interpreting all images on NAT, because NAT consists of 210 submarkers referring to 10 frequency components ranging from 4 to 20 Hz. Furthermore, there are some limitations for using the 210-dimensional NAT spaces for clinical application, 1) EEG at rest have been implicated in some functions of a Default Mode Network (DMN), not Central-Executive Network (CEN), 2) frequency range for NAT include low frequency range (θ, α, β band), not high frequency range (γ band), 3) reliability of NAT depends on the quality of the EEG databases of central nervous system (CNS) diseases.

Recently, to visualize 210-dimensional NAT spaces at a glance, we develop a visualization application called a NAT print, which is similar to fingerprint. This E-poster showed that we could classified two geometrical and symmetrical patterns in the 52 normal subjects comprised 28 men and 24 women aging 71.9 ± 5.9 years, group 1 (dominant alpha and beta rhythm in occipital-temporal regions), or group 2 (dominant frontal midline theta rhythm in frontal regions). The sensitivity-versus-specificity characteristics were assessed with NAT and were compared between the two groups, showing that separation of the group 1 and group 2 was made with a sensitivity of 78%, as well as a false-positive rate of 22%. In future, we would like to elucidate a relationship between geometric diversity on NAT print and several CNS disorders.

Biography

Takashi Shibata has completed his PhD at the age of 30 years from Graduate School of Medicine and Pharmacological Science, University of Toyama. He has been a user of NAT system from 2008, and participated Japan Science and Technology Agency with Brain Functions Laboratory Inc., Yokohama, Japan. He has published several papers in journals including Japanese paper about the NAT.

sibata@dj8.so-net.ne.jp

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J Neurol Neurophysiol
ISSN: 2155-9562 JNN, an open access journal

Neurosurgery and Neuroradiology 2016
August 22-24, 2016

Volume 7, Issue 4(Suppl)

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